

IN THE CLAIMS

1-10. (Canceled)

11. (Currently Amended) A method for forming a photoresist pattern on a large-scale substrate, comprising:

applying a photoresist composition to a ~~the~~ large-scale substrate by ~~with~~ a multi-micro nozzle-an (MMN) head coater,

drying the photoresist composition applied to the large-scale substrate to prepare a photoresist film;

placing a patterned mask over the photoresist film and substrate and exposing the photoresist film to light; and

developing the exposed photoresist film to obtain a photoresist pattern;

wherein the photoresist composition comprises:

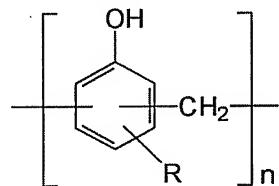
(a) 5 wt% to 30 wt% of a polymer resin represented by the following Chemical Formula 1;

(b) 2 wt% to 10 wt% of a diazide photoactive compound;

(c) 50 wt% to 90 wt% of an organic solvent; and

(d) 500 to 4000 ppm of a Si based surfactant:

Chemical Formula 1



wherein R is C₁ to C₄ alkyl, and n is an integer of 15 to 10,000, and wherein the Si-based surfactant is a polyoxyalkylene dimethylpolysiloxane copolymer compound,

wherein the composition and content of solvent and surfactant is controlled to prevent stains and improve coating characteristics in a photoresist film formed on the substrate from the photoresist composition, and

wherein stains include central stains, lateral stains, or cloudy stains.

12. (Withdrawn) The method of Claim 11, wherein the polymer resin is a novolak resin having a molecular weight ranging from about 2000 to 12,000.

13. (Withdrawn) The method of Claim 11, wherein the organic solvent is one or more substances selected from the group consisting of propyleneglycol methyl ether acetate (PGMEA), ethyl lactate (EL), 2-methoxyethylacetate (MMP), n-butyl acetate (nBA), propyleneglycol monomethyl ether (PGME), and ethyl-3-ethoxypropionate (EEP).

14. (Withdrawn) The method of Claim 11, wherein the organic solvent is a mixture of 50 wt% to 90 wt% of propyleneglycol methyl ether acetate (PGMEA) and 10 wt% to 50 wt% of ethyl-3-ethoxypropionate (EEP).

15. (Canceled)

16. (Withdrawn) The method of Claim 11, wherein the composition further comprises one or more nitrogen-containing crosslinking agents selected from the group consisting of a condensation product of urea and formaldehyde, a condensation product of melamine and formaldehyde, a methylol urea alkyl aldehyde condensate, a methylol urea alkylether, and a methylol melamine alkylether.

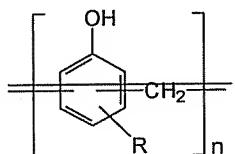
17. (Currently amended) The method of Claim 11, wherein the photoresist composition is applied by a pattern formation method, comprising:

- (a) ~~coating the photoresist composition on the substrate and drying it to prepare the photoresist film;~~
- (b) ~~placing a patterned mask on the substrate and exposing the photoresist film to light; and~~
- (c) ~~developing the exposed photoresist film to obtain a photoresist pattern, and~~

~~wherein the photoresist composition comprises:~~

~~5 wt% to 30 wt% of a polymer resin represented by the following Chemical Formula 1 which is a novolak resin having a molecular weight ranging from about 2,000 to 12,000, and; 2 wt% to 10 wt% of a diazide photoactive compound; 50 wt% to 90 wt% of an organic solvent of comprises one or more substances selected from the group consisting of propyleneglycol methyl ether acetate (PGMEA), ethyl lactate (EL), 2-methoxyethylacetate (MMP), n-butyl acetate (nBA), propyleneglycol monomethyl ether (PGME), and ethyl-3-ethoxypropionate (EEP); and 500 to 4000 ppm of a polyoxyalkylene dimethylpolysiloxane copolymer compound as a Si-based surfactant:~~

Chemical Formula 1



~~where R is a C₁ to C₄ alkyl, and n is an integer of 15 to 10,000,~~

~~wherein the organic solvent is a mixture of 50 wt% to 90 wt% of propyleneglycol methyl ether acetate (PGMEA) and 10 wt% to 50 wt% of ethyl-3-ethoxypropionate (EEP).~~

18. (Previously Presented) The method of Claim 11, wherein the photoresist composition further comprises one or more nitrogen-containing crosslinking agents selected from the group consisting of a condensation product of urea and formaldehyde, a condensation product of melamine and formaldehyde, a methylol urea alkyl aldehyde condensate, a methylol urea alkylether, and a methylol melamine alkylether.

19. (Currently amended) The method of Claim 11, wherein applying the photoresist composition is ~~coated~~ by the spray dispense method or the spin coating method.

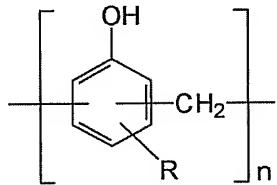
20. (Previously Presented) The method of Claim 11, which is applied to liquid crystal display circuits having a large-scale substrate glass.

21. (Previously Presented) A method to prevent stains in a photoresist film applied to a large-scale substrate by a multi-micro nozzle (MMN) head coater, comprising

applying a photoresist composition to the large-scale substrate with the MMN head coater by spray-dispense coating and spinning, wherein the photoresist composition comprises:

- (a) 5 wt% to 30 wt% of a polymer resin represented by the following Chemical Formula 1;
- (b) 2 wt% to 10 wt% of a diazide photoactive compound;
- (c) 50 wt% to 90 wt% of an organic solvent; and
- (d) 500 to 4000 ppm of a Si based surfactant:

Chemical Formula 1



wherein R is C₁ to C₄ alkyl, and n is an integer of 15 to 10,000,

wherein the Si-based surfactant is a polyoxyalkylene dimethylpolysiloxane copolymer compound, the organic solvent is a mixture of 50 wt% to 90 wt% of propyleneglycol methyl ether acetate (PGMEA) and 10 wt% to 50 wt% of ethyl-3-ethoxypropionate (EEP), and the composition and content of solvent and surfactant is controlled to prevent stains and improve coating characteristics in the photoresist film formed on the substrate from the photoresist composition, and

wherein stains include central stains, lateral stains, or cloudy stains.

22. (Previously presented) A photoresist film disposed on the large-scale substrate as prepared by the method of Claim 11.

23. (New) A photoresist composition for preventing stains in a photoresist film applied to a large-scale substrate, comprising

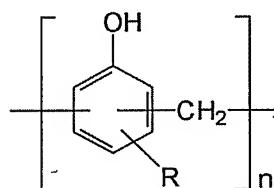
(a) 5 wt% to 30 wt% of a polymer resin represented by the following Chemical Formula 1;

(b) 2 wt% to 10 wt% of a diazide photoactive compound;

(c) 50 wt% to 90 wt% of an organic solvent; and

(d) 500 to 4000 ppm of a Si based surfactant:

Chemical Formula 1



wherein R is C₁ to C₄ alkyl, and n is an integer of 15 to 10,000,

wherein the Si-based surfactant is a polyoxyalkylene dimethylpolysiloxane copolymer compound, the organic solvent is a mixture of 50 wt% to 90 wt% of propyleneglycol methyl ether acetate (PGMEA) and 10 wt% to 50 wt% of ethyl-3-ethoxypropionate (EEP), and

wherein the composition and content of solvent and surfactant is controlled to prevent stains and improve coating characteristics in the photoresist film formed on the large-scale substrate from the photoresist composition such that the photoresist composition, when coated on a large-scale substrate with a multi-micro nozzle (MMN) head coater and formed into a photoresist film, does not exhibit stains including central stains, lateral stains, or cloudy stains.